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Snow Surveyors Climbing to a Snow Course

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

COLORADO RIVER DRAINAGE BASIN

MARCH 1, 1946

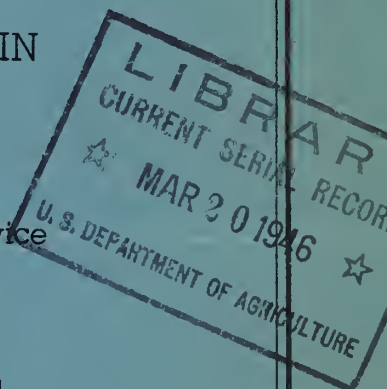
By

Division of Irrigation, Soil Conservation Service

United States Department of Agriculture

and

Colorado Agricultural Experiment Station



Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.

March 1, 1946

WATER SUPPLY OUTLOOK

COLORADO RIVER

The continued deficiency of precipitation over the headwaters of the Colorado River and its several tributary streams in Colorado during February has somewhat dimmed the water supply outlook. Conditions on the Yampa and White are fairly favorable. For the Colorado itself the situation is less bright. The Gunnison outlook is much less favorable now than a month ago. Grand Mesa snow cover is considerably less than normal. For the southwestern sections of Colorado the prospects are very discouraging. It is expected that the Dolores and the San Juan will fall quite short of normal runoff. The outlook for the Salt and Gila rivers is very disappointing and the runoff from snow cover will be extremely light. For the Green River in western Wyoming the snow conditions are fairly good, exceeding that of last year by more than 50 percent and somewhat better than average for this time of year.

COLORADO RIVER AND TRIBUTARIES

ABOVE GRAND JUNCTION IN COLORADO

The average increase in the water content of the snow over the headwaters of the Colorado during February was about 1 1/2 inches which brought the overall content up to 10.1 inches as compared with 9.7 a year ago. The condition is slightly below the 11-year average. The accumulation of snow in the high mountain country during the past month has been relatively light which results in a less favorable outlook now than a month ago. At Lake Irene and at Fremont, Loveland and Shrine Passes the snow depth is much better than a year ago. There is, however, a deficiency of snow on Grand Mesa.

Stream flow is holding up well, probably the result of ice now melting at lower elevations together with a limited runoff from low snow of shallow depth. The mountain and valley soil moisture is generally good. Green Mountain Reservoir, on the Blue River south of Kremmling, has in storage 66,800 acre-feet. Last year at this time it was 70,100. The runoff from the Blue River drainage will no doubt be sufficient to fill this reservoir during June and early July this year.

The runoff in the Colorado River at Glenwood Springs, as based on the present snow cover, should exceed 1,000,000 acre-feet during the April-July period of 1946.

GUNNISON

The build-up of the snow cover over the headwaters of the Gunnison and its tributaries during February has been disappointing. The average gain in the water content of the snow over the drainage during the past month has been about 1 inch. A year ago the average water content was 13.3 inches and is now 8.7 which is 70 percent of the 11-year average. Snow depths on Grand Mesa have over the past years been greater than found elsewhere. At this time the cover at Trickle Divide is 45 inches, last year 85, with an average depth of 75 inches. The water content of the snow on the Iron-ton Park course, near Ouray, suffered a loss of about 1 inch during the past month.

The general water supply outlook for the Gunnison is not bright at this time. There will probably be sufficient runoff this spring from the snow on Grand Mesa to fill a major portion of the many lakes on the Mesa. Taylor Park Reservoir, now has 83,500 acre-feet in storage, last year 57,600. This is about 25 percent more than last year. There was about 1,000 acre-feet stored during February. The reservoir is now at 79 percent of capacity. Unless there is a serious deficiency in precipitation during the remainder of this winter and spring this reservoir may be expected to fill to spillway capacity. Mild weather has induced the melting of ice in the streams and low snow cover which has been sufficient to maintain stream flow at normal stage. Soil moisture is generally fair to good throughout the irrigated areas and range and crop conditions satisfactory.

YAMPA AND WHITE RIVERS

The present water content of the snow on the Yampa drainage averages 14.9 inches which is nearly one inch more than it was a year ago. The past month's accumulation approximates 3 inches of water which brings the snow-water-storage above the normal amount. Stream flow continues to be normal. Mountain area is completely snow covered and the lower valley has practically no snow. Western Moffat county is dry. The present outlook for a favorable runoff in the Yampa is quite encouraging. The prospects for this drainage appear to be better than elsewhere throughout western Colorado.

For the White River the average water content is now 11.8 inches which is about 1 1/2 inches less than normal. The outlook is quite favorable for a satisfactory runoff in this stream during the coming summer.

DOLORES RIVER

The outlook for the coming season's irrigation water supply is not encouraging at this time. The recent snow surveys on the drainage area of this stream show the water content of the snow to be about 2/3 of the amount measured last year at this time and approximately 60 percent of normal. For the irrigated area in the vicinity of Dolores and Cortez the soil moisture is fair and crop conditions poor. Stream flow is at a minimum. Unless much above normal precipitation occurs during the coming spring months a water shortage is to be expected. Storage in the Groundhog reservoir is 8,500 acre-feet, last year at this time it was 8,000.

SAN JUAN RIVER

Because of the continued subnormal precipitation throughout the southwestern part of Colorado and northern New Mexico there has been no substantial

accumulation in the water content of the snow on the headwaters of this stream and its tributaries during the past month. The present water content is about $\frac{3}{8}$ of that of a year ago and likewise in comparison with the normal. The condition now existing is most unfavorable and is found to be the poorest over the past 11 years of record. Should there be normal snowfall on the drainage area for the remainder of the winter and spring months it is doubtful if the resulting runoff will be sufficient to provide an ample irrigation supply this season. Mild weather has resulted in the melting of ice in the streams and some of the snow at lower elevations which has maintained stream flow at more or less normal stage. Soil moisture is generally low and the crop conditions poor at the present time. Mountain slopes, south exposure, below 7,500 feet are bare of snow. Reservoir storage is below normal.

GREEN RIVER

The outlook for the coming season's runoff in the Green River is quite favorable at this time. The recent snow surveys show the average water content of the snow to be 11.7 inches which is 4 inches more than a year ago and nearly $1\frac{1}{2}$ inches above the 11-year mean. As based on the present snow condition and assuming more or less normal snowfall for the remainder of the winter season, it is to be expected that the season's runoff will be approximately normal.

SALT AND GILA RIVERS

The overall outlook for the runoff in these streams this season, as based on snow cover in the mountains at this time, is poor. The average water content on both drainage areas is less than 10 percent of that of a year ago and is likewise 10 percent of the average for this season of the year. The present snow cover can add little to the spring and summer runoff. The storage of water in the principal reservoirs of the Salt River valley is approximately 700,000 acre-feet. A year ago at this time the filling was about 900,000. Some additional storage can be expected during March. Rising temperatures and depletion of soil moisture are increasing the demand for water. At this time the crops are in excellent condition. In the Prescott area the precipitation during February has been below normal, soil moisture is very poor and stream flow less than normal stage. Dry weather has reduced the range and crop conditions.

The present prospects of runoff in the Gila are discouraging and the general outlook for the coming season's irrigation water supply is rather disappointing. The storage in San Carlos reservoir is now less than 30,000 acre-feet and approximates a minimum over the past several years. Runoff from snow cover on the headwaters of the Gila will be slight. Drought conditions have reduced stream flow well below normal for this time of year. Soil moisture in the irrigated areas is fair with range and crop conditions fairly satisfactory.

SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

COLORADO RIVER BASIN

March 1, 1946

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation October 1 to February 23	Departure from Normal	Precipitation February	Departure from Normal
		Inches	Inches	Inches	Inches
Colorado	Colorado	5.07	-2.26	0.48	-1.32
Green	Wyoming	3.37	-0.06	0.47	-0.23
San Juan	New Mexico	2.59	-1.54	0.19	-0.71
Gila	Arizona	4.21	-2.25	0.36*	-1.18*
Gila	New Mexico	3.79	-0.51	0.04	-0.81

*February Precipitation tentative.

The accumulated precipitation since October 1 over the watershed of the Colorado River in Colorado, Wyoming, New Mexico and Arizona was considerably below normal. Precipitation during February was also deficient. In the southwestern part of the drainage area the deficiency is becoming serious.

SUMMARY OF MARCH 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	Snow Depth		Water Content		Number Courses in Average	Snow Density		1946 Water Content in percent of	
	Eleven Year Avg.*	1945	1946	Eleven Year Avg.*		Eleven Year Avg.*	1946	Eleven Year Avg.*	1945
COLORADO RIVER	In. 39.8	In. 33.2	In. 10.1	Percent 26	21	Percent 25	Percent 26	98	104
Colorado River**	39.1	47.6	14.9	29	4	29	31	106	106
Yampa River	45.0	41.4	11.3	29	2	27	29	89	104
White River	44.5	47.8	13.3	28	9	28	30	70	66
Gunnison River	35.2	29.1	8.7	26	4	23	28	62	67
Dolores River	40.2	20.0	5.6	29	7	29	24	37	38
San Juan River	3.2	39.5	11.4	28	6	28	29	9	7
Gila River	8.0	9.8	2.7	29	5	31	33	4	6
Salt River	37.5	5.5	1.7	27	4	24	27	114	158
Green River		30.4	7.4						

*Same for shorter periods. **Above Grand Junction, Colorado.

COLORADO RIVER WATERSHED

Summary of Federal and State Cooperative Snow Surveys
Issued March 11, 1946, at Fort Collins, Colo.

No.	Main Drainage and Course	Local Drainage	State	Location		Elev.	National Forest	Mar. 1 Snow Cover Measurements			
				Locality	Description			Av. Snow Depth	Snow Depth	Av. Water Content	Water Content
								1945	1946	1945	1946
								In.	In.	Av. @	In.
COLORADO RIVER (Above Grand Junction)											
7	Park View*	Willow Cr.	Colo.	7mi. SE. Rand	24-5N-78W	9200	Routt	30.1	28.7	7.1	In.
12	Phantom Valley	Colorado R	"	11mi. N. Grand L.	7-5N-75W	9300	Ry. Mtn. N.P.	31.5	30.6	8.2	6.1
16	Berthoud Pass	Fraser R.	"	4mi. S. West Port.	35-2S-75W	9700	Arapaho	47.2	42.3	12.4	8.1
19	Tennessee Pass*	Eagle River	"	Tennessee Pass	21-8S-80W	10200	San Isabel	31.4	25.9	7.2	11.1
33	Ind. Pass Tunnel	Lincoln Gulch	"	W. Port. Tunnel	30-11S-82W	10200	White River	45.0	40.1	12.9	12.2
34	N. Lost Trail Cr.	Crystal R.	"	3mi. E. Marble	20-11S-87W	9200	"	42.8	38.1	10.1	6.0
37	M. Fork Camp Cr.	Williams Fk	"	13mi. N. Dillon	16-3S-77W	9000	Arapaho	33.1	33.5	8.0	13.3
44	Wiggle Gulch	Eagle River	"	2mi. E. Mitchell	1-3S-80W	11000	White River	44.0	37.1	11.6	0.0
45	Nast	Frying Pan R.	"	23mi. SE. Basalt	1-3S-83W	8700	"	23.1	10.2	5.5	8.5
56	Mesa Lakes	Mesa Creek	"	15mi. E. Palisade	35-11S-86W	10000	Grand Mesa	47.2	48.5	12.9	12.8
59	Lulu	Lulu Creek	"	14mi. N. Grand L.	25-6N-76W	10200	Ry. Mtn. N.P.	47.4	45.9	13.4	5.1
62	Willow Creek P.	Willow Cr.	"	Willow Cr. Pass	1-4N-78W	9500	Arapaho	35.7	36.3	8.8	6.7
64	N. Inlet Grand L.	N. Inlet Cr.	"	4mi. NE. Grand L.	26-4N-75W	9000	Ry. Mtn. N.P.	28.6	22.0	6.9	12.7
65	Lake Irene	Beaver Creek	"	1mi. SW. Milner P.	8-5N-75W	10600	"	54.9	52.8	15.5	8.4
66	Thunderbolt Peak	Buchanan Cr.	"	5mi. R. Monarch L.	22-2N-74W	9500	Arapaho	48.2	57.7	12.4	17.7
69	Arrow	S. Ranch Cr.	"	Arrow	34-1S-75W	9900	"	31.4	35.4	7.5	12.2
70	Lapland	St. Louis Cr.	"	7mi. SW. Fraser	16-2S-76W	9300	"	35.3	36.5	8.5	6.1
79	Fremont Pass #2	Blue River	"	Fremont Pass	2-8S-79W	11400	"	47.1	40.0	11.8	0.0
91	Lynx Pass No. 2	Rock Cr.	"	7mi. NE. Toponas	27-2N-83W	9100	Routt	30.6	34.8	10.4	13.3
96	Shrine Pass	Blue River	"	Shrike Pass	15-6S-79W	10500	Arapaho	47.3	43.0	12.4	10.5
97	Gri-zly Peak	"	"	1mi. W. Loveland P.	2-5S-76W	11250	"	43.9	42.4	12.9	14.3
100	Ivanhoe	Ivanhoe Cr.	"	1mi. S. L. Ivanhoe	12-2S-82W	10400	White River	39.8	36.1	9.7	14.8
Average for Drainage								39.8	36.1	10.5	10.4
YAMPA RIVER											
6	Dry Lake	Soda Creek	Colo.	4mi. NE. Steam. Spgs	26-7N-84W	8200	Routt	51.4	47.7	15.3	16.8
8	Columbine Lodge*	Harrison Cr.	"	Rbt. Ears Pass	21-5N-82W	9300	"	61.5	60.1	17.8	20.9
9	Elk River	Independence Cr.	"	Columbine	6-10N-85W	8700	"	43.9	40.9	12.4	11.4
91	Lynx Pass No. 2*	Morrison Cr.	"	7mi. NE. Toponas	27-2N-83W	9100	"	39.6	34.8	10.4	10.5
Average for Drainage								49.1	47.6	14.0	14.9
WHITE RIVER											
35	Burro Mountain	N. Elk Creek	Colo.	8mi. S. Buford	15-2S-91W	9000	White River	42.4	44.0	14.7	13.2
36	Rio Blanco	White River	"	4mi. NW. Trappers L	28-1N-88W	8500	"	40.6	39.2	11.7	10.4
Average for period of record.								45.0	41.6	13.2	11.8

*On adjacent drainage. @Average for period of record.

COLORADO RIVER WATERSHED
Summary of Federal and State Cooperative Snow Surveys
Issued March 11, 1946, at Fort Collins, Colo.

Main Drainage and Snow Course	Local Drainage	State	Location Locality	Description	Elev.	National Forest	Mar. 1 Snow Cover Measurements								
No.							Av. @	In.	1945	Av. @	In.	1945	Water Content		
GILA RIVER															
11	Frisco Divide		Blue River	N. Mex.	6mi. S. Luna		31-6S-20W	8000	Apache	8.3	13.8	1.7	2.2	3.7	0.5
14	State Line	"	"	"	Alpine/Luna		6-6S-21W	8000	"	10.4	14.2	0.9	2.6	4.2	0.2
22	Taylor Creek	"	Taylor Creek	"	2mi. NE. Inmans		20-10S-10W	7850	Gila	0.9	0.0	0.0	0.1	0.0	0.0
23	Inman	N. Mex.	Taylor Creek		1mi. SW. Inmans		6-11S-10W	7300	Gila	--	--	0.0	--	--	0.0
3	Nutrioso	Ariz.	San Fran. R.		5mi. SE. Nutrioso		23-6N-30E	3500	Apache	7.6	8.1	1.5	2.1	1.5	0.5
4	Beaver Head	"	Castle Cr.		11mi. SW. Alpine		13-4N-30E	8000	"	10.5	10.6	0.0	3.1	3.3	0.0
5	Coronado Trail	"	Coleman Cr.		4mi. S.		26-5N-30E	8000	"	11.6	12.4	0.1	3.6	3.4	T
							Average for Drainage			8.2	9.8	0.7	2.3	2.7	0.2
SALT RIVER															
4	Beaver Head*	Ariz.	Beaver Cr.		11mi. SW. Alpine		13-4N-30E	8000	Apache	10.5	10.6	0.0	3.1	3.3	0.0
5	Coronado Trail*	"	Coyote Cr.		4mi. S.		26-5N-30E	8000	"	11.6	12.4	0.1	3.6	3.4	T
6	McNary	"	Salt River		3mi. NW. McNary		14-3N-23E	7200	Apache Res	9.2	3.4	0.8	2.7	1.5	0.4
7	Forestdale	"	"		5mi. SW. Showlow		2-9N-21E	6000	"	4.2	0.9	0.6	1.2	0.3	0.3
9	Milk Ranch	"	"		4mi. W. McNary		28-8N-23E	7000	"	4.7	0.3	0.0	1.1	0.1	0.0
10	McKay	"	"		7mi. SE. McNary		13-7N-24E	8250	Apache Res	--	--	--	--	--	--
11	Iron Springs	"	"		Iron Springs		22-14N-3W	6200	Prescott	--	--	0.0	--	--	0.0
12	Camp Wood	"	"		Camp Wood		3-16N-6W	5700	"	--	--	0.0	--	--	0.0
							Average for Drainage			8.0	5.5	0.3	2.3	1.7	0.1
GREEN RIVER															
23	Dutch Joe	Wyo.	Dutch Joe Cr.		12mi. N. Elkhorn		33-31N-104W	8700	Bridger	--	--	--	--	--	--
24	Mulligan Park	"	Surveyor Cr.		Fremont Lake		17-35N-108W	8900	"	34.8	29.4	36.6	8.6	7.8	9.9
25	Kendall R. S.	"	Green River		27mi. NW. Pinedale		23-38N-110W	7900	"	32.8	24.7	42.5	10.5	5.4	11.7
26	Loomis Park	"	Beaver Cr.		28mi. " "		14-37N-111W	8500	"	46.4	36.5	54.6	13.0	9.6	15.6
44	E. Rim Divide	"	Fish Cr.		13mi. SE. Bondurant		32-37N-111W	7950	"	36.0	31.0	39.0	9.0	6.8	9.5
							Average for drainage			37.5	31.4	43.2	10.3	7.4	11.7

*On adjacent drainage

@Average for period of record

The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer
Wyoming State Engineer
Utah State Engineer
New Mexico State Engineer
Montana State Engineer
Nebraska State Engineer
Colorado Experiment Station
Colorado Extension Service
Montana Experiment Station
Utah Experiment Station

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Interior
Bureau of Reclamation
Indian Service
Geological Survey
National Park Service
Department of Commerce
Weather Bureau
War Department
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company
Western Colorado Power Company
Montana Power Company
Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

City of Bozeman
City of Denver
City of Boulder

WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association
Arkansas Valley Ditch Association
Colorado River Water Conservation District

IRRIGATION PROJECTS

Farmers Reservoir and Irrigation Company
San Luis Valley Irrigation District
Santa Maria Reservoir Company
Costilla Land Company
Uncompahgre Valley Water Users' Association
Wyoming Development Company
Goshen Irrigation District
Kendrick Project
Pathfinder Irrigation District
Salt River Valley Water Users' Association
San Carlos Irrigation and Drainage District

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

